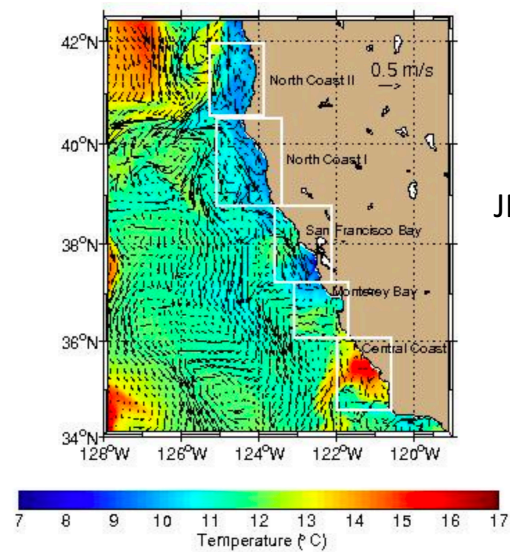# A proposed OSSE effort for assimilation of surface wind & current data using a coupled coastal ocean-WRF model

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JPL's high-resolution ROMS-based assimilation system for the California Current

Motivation

Simultaneous measurements of ocean surface winds and currents by WaCM have potentially significant benefits for studying coastal ocean dynamics, air-sea interaction, and bio-physical interaction.

Objectives

- To demonstrate the impacts of simultaneous wind/current measurements in constraining the representation of coastal ocean state and air-sea interaction.
- To provide quantitative results for developing the Science Traceability Matrix (STM).

Method

- Configure a coupled ROMS-WRF coastal system with 1-km resolution (both for ROMS and WRF) for the California Current and Alaska Coastal Current system.
- Perform OSSEs to test the impacts of surface wind/current assimilation using a multi-scale variational assimilation scheme.

Procedure

- Perform a "nature run" using the coupled ROMS-WRF model.
- Sampled the nature run using WaCM's sampling characteristics for wind/current measurements, and use them as synthetic observations.
- Perturb the ROMS-WRF model with different initial conditions.
- Assimilate the synthetic observations into the perturbed runs using observational error estimates characteristic of WaCM.
- Examine the impacts on various diagnostics: including along-shore and cross-shelf transports (of volume, heat, and freshwater), upwelling and filaments, EKE, and ocean-atmosphere kinetic energy exchange.
- Modify the envisioned sampling & error characteristics of WaCM and test the corresponding impacts on the aforementioned diagnostics (useful for the STM)
- Perform additional OSSE to assess the value of WaCM's wind and current observations beyond value from existing observations (e.g., SSH, SST, coastal HF radar measurements of surface currents).